Proton Plan
Cost and Schedule Status
March 2005

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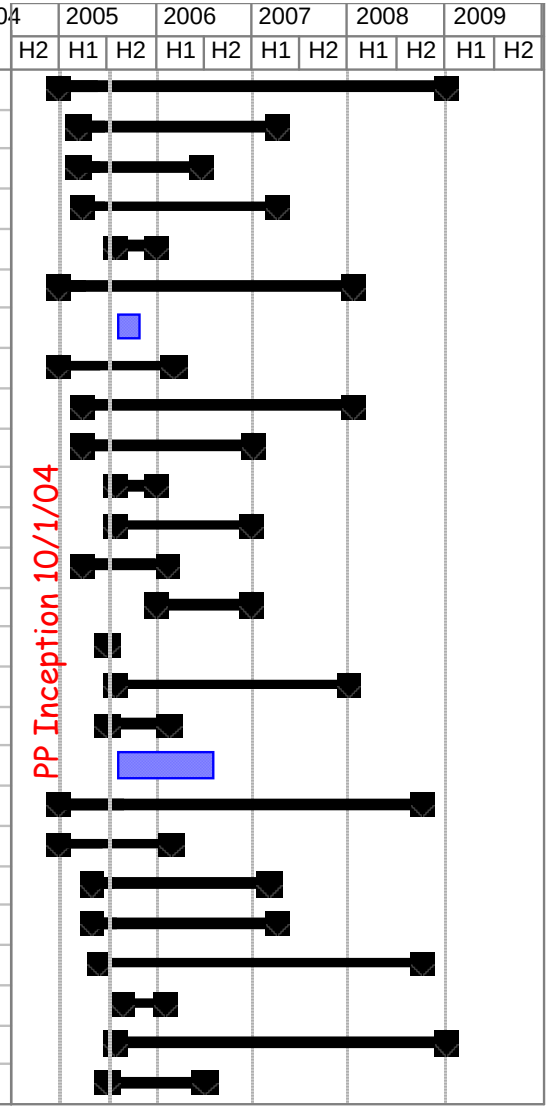
Proton Plan Development Progress

- This is a "Work in Progress"
- The intent of the following is to present that we have developed the plan sufficiently to begin understanding the resources and timeframe required to meet the Proton Plan goals.
- We are working toward a baseline resource loaded schedule. Our goal is to present the nearly baselined version at the next PMG.
- A Director's review will be organized as soon as we are ready for baseline. Note that MIRF and MI Collimators may not be fully developed at that time.
- For reference there are ~290 lines in the current Proton Plan schedule.

Proton Plan Schedule - Level 3 Summary

WBS	Name	Start	Finish
1	Proton Plan	Thu 9/30/04	Tue 9/30/08
1.1	**Linac Upgrades**	**Wed 12/15/04**	**Tue 1/2/07**
1.1.1	Linac PA Vulnerability	Wed 12/15/04	Mon 3/20/06
1.1.2	Linac Quad Power Supplies	Mon 1/3/05	Tue 1/2/07
1.1.3	Linac Instrumentation Upgrade (descoped)	Mon 5/2/05	Fri 9/30/05
1.2	**Booster Upgrades**	**Thu 9/30/04**	**Tue 10/16/07**
1.2.1	Determine Rep Rate Limit	Mon 5/2/05	Fri 7/29/05
1.2.2	OrBump System	Thu 9/30/04	Fri 12/9/05
1.2.3	Corrector System	Tue 1/4/05	Tue 10/16/07
1.2.4	30 Hz Harmonic	Mon 1/3/05	Tue 10/3/06
1.2.5	Gamma-t System	Mon 5/2/05	Fri 9/30/05
1.2.6	Alignment Improvements	Mon 5/2/05	Fri 9/29/06
1.2.7	Drift Tube Cooling	Tue 1/4/05	Mon 11/14/05
1.2.8	Booster RF Cavity #20	Mon 10/3/05	Wed 9/27/06
1.2.9	Booster Solid State RF Pas (descoped)	Fri 4/1/05	Fri 4/1/05
1.2.10	Booster Instrumentation Upgrade (descoped)	Mon 5/2/05	Fri 9/28/07
1.2.11	Booster Dump Relocation	Fri 4/1/05	Mon 11/21/05
1.2.12	Booster Chopper	Mon 5/2/05	Fri 4/28/06
1.3	**Main Injector Upgrades**	**Thu 9/30/04**	**Tue 7/1/08**
1.3.1	Large Aperture Quads	Thu 9/30/04	Thu 12/1/05
1.3.2	Main Injector Collimation System	Tue 2/1/05	Mon 12/4/06
1.3.3	NuMI Multibatch Operation	Mon 2/7/05	Tue 1/2/07
1.3.4	Main Injector RF Upgrade	Tue 3/1/05	Tue 7/1/08
1.3.5	MI Instrumentation Upgrades (descoped)	Wed 6/1/05	Mon 11/7/05
1.4	**Management**	**Mon 5/2/05**	**Tue 9/30/08**
1.5	**Proton Study Group**	**Fri 4/1/05**	**Fri 3/31/06**



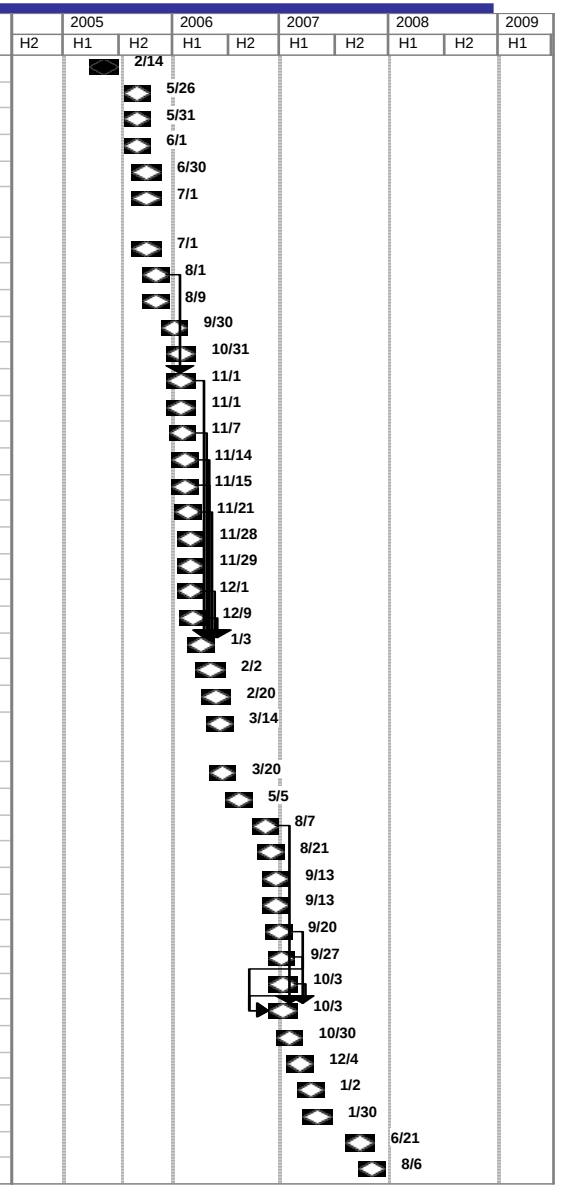
Proton Plan Costs - Level 3 Summary

WBS	Estimate	Name	M&S Escalated, K	Cont. %	M&S W/ Cont., K	M&S & SWF Esc.+ Cont, K
1	Type	Proton Plan	$16,644	30%	$21,684	$30,300
1.1		**Linac Upgrades**	**$2,046**	**13%**	**$2,303**	**$3,249**
1.1.1	Bottom Up	Linac PA Vulnerability	$1,434	1%	$1,446	$1,633
1.1.2	Bottom Up	Linac Quad Power Supplies	$612	40%	$857	$1,616
1.1.3		Linac Instrumentation Upgrade (descoped)	$0	0%	$0	$0
1.2		**Booster Upgrades**	**$2,756**	**40%**	**$3,859**	**$7,871**
1.2.1	Top Down	Determine Rep Rate Limit	$0	40%	$0	$25
1.2.2	Bottom Up	OrBump System *	$117	40%	$164	$294
1.2.3	Bottom Up	Corrector System AIP Candidate FY05	$1,018	40%	$1,425	$4,384
1.2.4	Bottom Up	30 Hz Harmonic AIP Candidate FY06	$1,019	40%	$1,426	$1,657
1.2.5	Bottom Up	Gamma-t System	$0	0%	$0	$103
1.2.6	Top Down	Alignment Improvements	$0	0%	$0	$50
1.2.7	Bottom Up	Drift Tube Cooling	$3	40%	$4	$12
1.2.8	Bottom Up	Booster RF Cavity #20	$350	40%	$489	$850
1.2.9		Booster Solid State RF Pas (descoped)	$0	0%	$0	$0
1.2.10		Booster Instrumentation Upgrade (descoped)	$0	0%	$0	$0
1.2.11	Top Down	Booster Dump Relocation	$97	40%	$136	$240
1.2.12	Top Down	Booster Chopper	$152	40%	$213	$257
1.3		**Main Injector Upgrades**	**$11,829**	**31%**	**$15,505**	**$17,718**
1.3.1	Bottom Up	Large Aperture Quads	$269	40%	$377	$1,432
1.3.2	Top Down	Main Injector Collimation System AIP Candidate FY06	$628	40%	$880	$1,375
1.3.3	Top Down	NuMI Multibatch Operation	$304	40%	$426	$650
1.3.4	Bottom Up	Main Injector RF Upgrade MIE Candidate FY07	$10,558	30%	$13,725	$14,143
1.3.5	Bottom Up	Instrumentation Upgrades	$70	40%	$98	$119
1.4		**Management**	**$12**	**40%**	**$17**	**$1,427**
1.5		**Proton Plan Phase I Study**	**$1**	**0%**	**$1**	**$35**

* Orbump Magnet costs are collected in Run II E. Prebys/J. Sims

All Milestones

WBS	Name	Finish
1.1.1.1.2	Linac Task Force Phase 1 Report Issued	Mon 2/14/05
1.3.4.1.6	Review MI RF Upgrade Prototype Test (Internal)	Thu 5/26/05
1.3.2.1.2.2	Review Concept for MI-8 Collimation System	Tue 5/31/05
1.5.2	Submit Preliminary Proton Study Group Report	Wed 6/1/05
1.1.1.1.4	Linac Task Force Phase 2 Report Issued	Thu 6/30/05
1.1.2.1.5	Linac Quad Power Supplies Design & Dwgs Complete	Fri 7/1/05
1.2.2.1.2.6	OrBump Magnets Ready for Install on Girder	Fri 7/1/05
1.2.2.1.3.4	OrBump Stripline Assy Complete	Mon 8/1/05
1.2.2.1.4.5	OrBump Girder Assy Complete	Tue 8/9/05
1.2.2.2.10	OrBump Power Supply Ready for Installation	Fri 9/30/05
1.2.4.1.1	30 Hz Harmonic Project Decision	Mon 10/31/05
1.4.5	Start 2005 Shutdown	Tue 11/1/05
1.5.3	Submit Final Proton Study Group Report	Tue 11/1/05
1.3.2.1.2.7	MI-8 Collimators Installation Complete	Mon 11/7/05
1.3.3.1.3.1.4	Barrier Bucket Cavity Installation Complete	Mon 11/14/05
1.2.11.3.10	Booster Dump Relocation Installation Complete	Tue 11/15/05
1.3.1.1.7.5	Large Aperture Quad P.S. Installation Complete	Mon 11/21/05
1.3.2.1.3.2	Review Concept for MI Collimation System	Mon 11/28/05
1.2.3.3.3	Corrector PS Design Complete	Tue 11/29/05
1.3.1.1.6.3	Large Aperture Quads Align/Install Complete	Thu 12/1/05
1.2.2.1.6.6	OrBump System Installation Complete	Fri 12/9/05
1.4.6	Finish 2005 Shutdown	Tue 1/3/06
1.3.4.1.5	Review MI RF Upgrade Plan	Thu 2/2/06
1.2.3.1.5	Corrector Prototype Magnet Complete	Mon 2/20/06
1.1.2.2.2.5	Linac Quad Tank #1 Commissioning Complete	Tue 3/14/06
1.1.1.1.6	Linac Task Force Complete	Mon 3/20/06
1.2.8.1.3.4	RF Cavity #20 Misc Control Modules Ready for Installation	Fri 5/5/06
1.4.7	Start 2006 Shutdown	Mon 8/7/06
1.2.8.1.4.5	RF Cavity #20 Solid State Driver Amplifier Ready for Installation	Mon 8/21/06
1.2.8.1.1.4	RF Cavity #20 Ferrite Bias Supply Ready for Installation	Wed 9/13/06
1.2.8.1.2.5	RF Cavity #20 Misc Control Modules Ready for Installation	Wed 9/13/06
1.3.2.1.3.7	MI Collimation System Install/Align Complete	Wed 9/20/06
1.2.8.1.7	RF Cavity#20 Installation Complete	Wed 9/27/06
1.2.4.2.4	30Hz Installation Complete	Tue 10/3/06
1.4.8	Finish 2006 Shutdown	Tue 10/3/06
1.3.4.2.7	DOE Approve MIE Line Item Package	Mon 10/30/06
1.3.2.1.4	Main Injector Loss Mitigation Complete	Mon 12/4/06
1.1.2.2.3.4	Linac Quad Installation Complete	Tue 1/2/07
1.2.3.4.5	Corrector PS Fabrication Complete	Tue 1/30/07
1.2.3.2.8	Corrector Magnets Ready for Installation	Thu 6/21/07
1.4.9	Start 2007 Shutdown	Mon 8/6/07



Progress as of March 31, '05

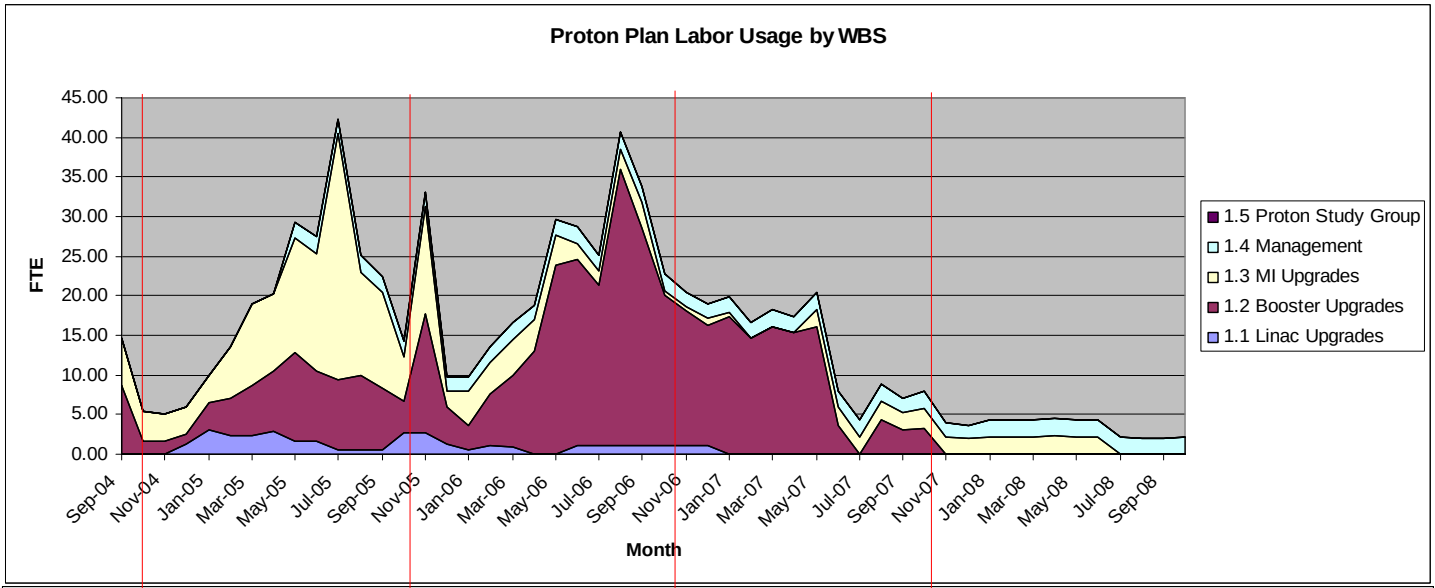
WBS	Name	Planned %	Actual %	A/P %
1	Proton Plan	3%	3%	100%
1.1	Linac Upgrades	4%	4%	100%
1.2	Booster Upgrades	2%	2%	100%
1.3	Main Injector Upgrades	5%	5%	100%
1.4	Project Management	4%	4%	100%
1.5	Proton Study Group	0%	0%	100%

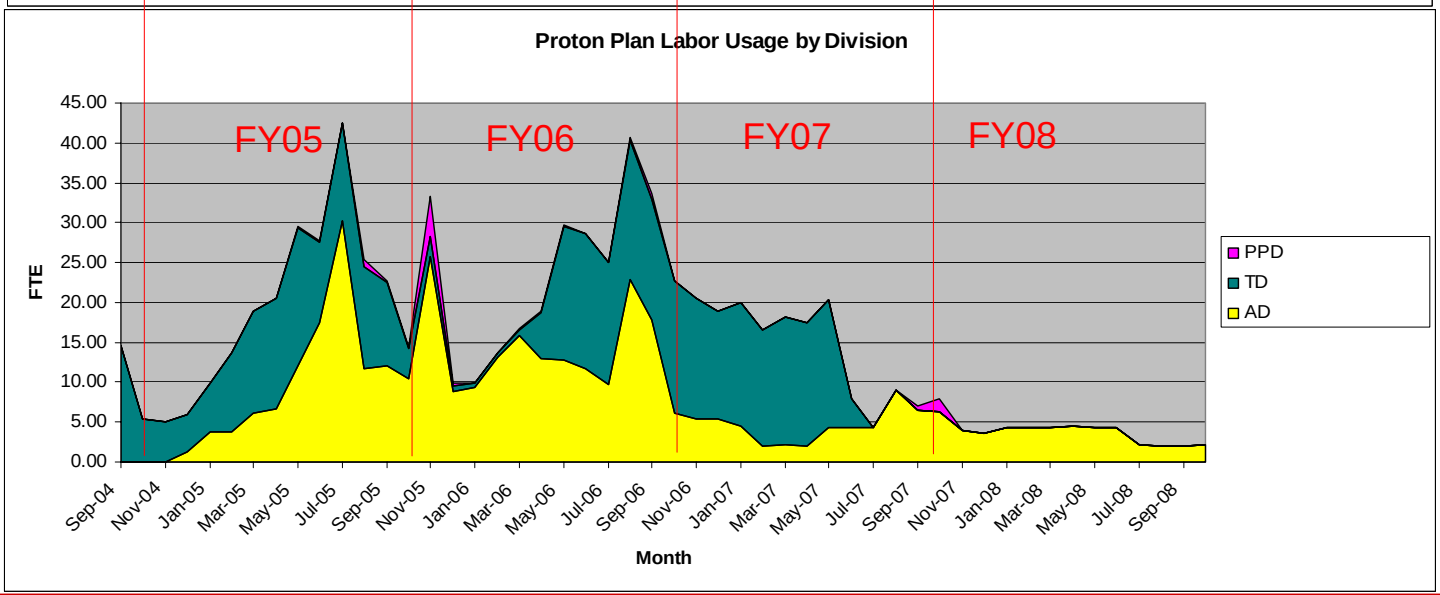
Effort for March '05

WBS	WBS Name	Actual FTE	Plan FTE	
1	**Proton Plan**	**14.9**	**20.9**	
1.1	Linac Upgrades	1.0	2.4	*
1.2	Booster Upgrades	2.0	6.3	*
1.3	Main Injector Upgrades	10.5	10.2	
1.4	Project Management	1.4	2	
1.5	Proton Study Group	0.0	0	

*Likely not reporting to new cost codes….Project Management will review monthly Division effort reports and work with level 3 managers to ensure everyone charges to the proper Proton Plan tasks

Proton Plan SWF Planned Usage





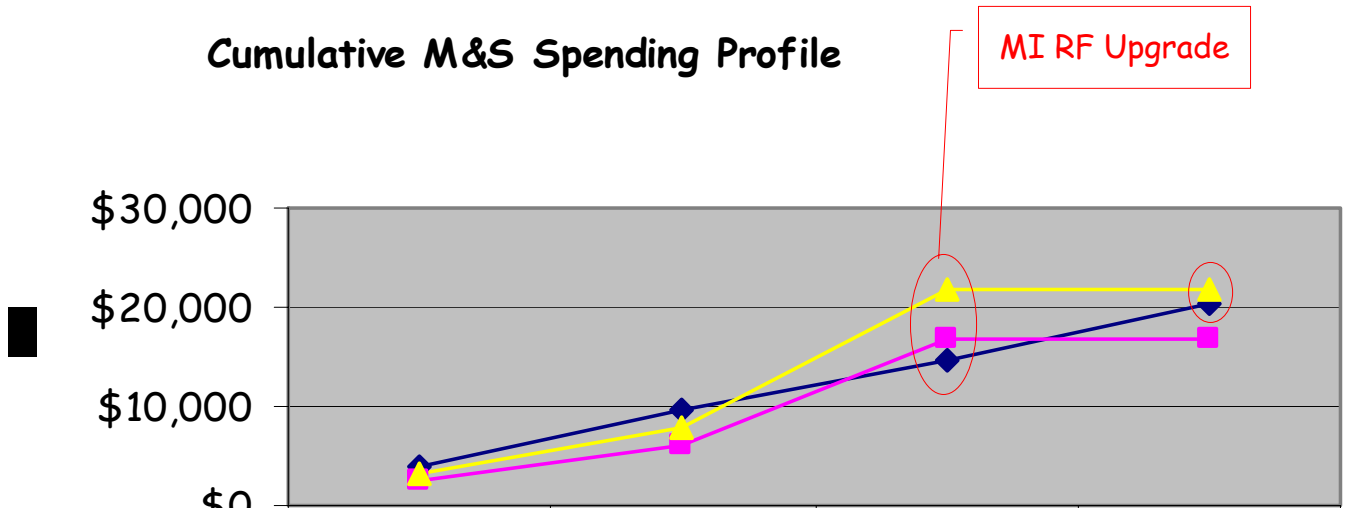
M&S Spending- Direct, No Contingency

7835 Tubes*

M&S Spending by Obligation In $K		Planned					Inception To date Costs			%Used
		Estimate								ITD Obl+RIP
		FY05	FY06	FY07	FY08	Total	Actual	Obligatio	Obl+RIP	/Total Est
1	Proton Plan	2,617	3,344	10,678	4	16,644	175	2,317	2,318	14%
1.1	**Linac Upgrades**	**1,468**	**578**	**0**	**0**	**2,046**	**2**	**1,955**	**1,955**	**96%**
1.1.1	Linac PA Vulnerability	1,431	3	0	0	1,434	0	1,932	1,932	135%
1.1.2	Linac Quad Power Supply	38	574	0	0	612	0	0	0	0%
1.1.3	Linac Instrumentation Upgrade (descoped)	0	0	0	0	0	2	23	23	0%
1.2	**Booster Upgrades**	**393**	**2,245**	**117**	**1**	**2,756**	**20**	**109**	**109**	**4%**
1.2.1	Determine Rep Rate Limit	0	0	0	0	0	0	0	0	#DIV/0!
1.2.2	Orbump System	117	0	0	0	117	9	97	97	83%
1.2.3	Corrector System	166	735	117	1	1,018	9	10	10	1%
1.2.4	30 Hz Harmonic	32	987	0	0	1,019	0	0	0	0%
1.2.5	Gamma T System	0	0	0	0	0	0	0	0	0%
1.2.6	Alignment Improvements	0	0	0	0	0	0	0	0	0%
1.2.7	Drift Tube Cooling	0	3	0	0	3	0	0	0	0%
1.2.8	Booster Cavity #20	0	350	0	0	350	2	2	2	1%
1.2.9	Booster SS RF PA's	0	0	0	0	0	0	0	0	0%
1.2.10	Booster Instrumentation Upgrade (descoped)	0	0	0	0	0	0	0	0	0%
1.2.11	Booster Dump Relocation	15	82	0	0	97	0	0	0	0%
1.2.12	Booster Chopper	63	89	0	0	152	0	0	0	0%
1.3	**Main Injector Upgrades**	**754**	**518**	**10,558**	**0**	**11,829**	**153**	**254**	**255**	**2%**
1.3.1	Large Aperature Quads	253	17	0	0	269	153	190	191	71%
1.3.2	MI Collimation System	204	424	0	0	628	0	0	0	0%
1.3.3	NuMI Multibatch Operation	227	77	0	0	304	0	64	64	21%
1.3.4	MI RF Upgrade	0	0	10,558	0	10,558	0	0	0	0%
1.3.5	MI Instrumentation Upgrade	**70**	**0**	**0**	**0**	70	**0**	**0**	**0**	**0%**
1.4	**Management**	**1**	**3**	**4**	**4**	12	**0**	**0**	**0**	**0%**
1.5	**Proton Study Group**	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**	**0%**

* 500K will be covered by Run II

M&S Spending Profile



Plan exceeds initial guidance by $1million

M&S Estimate Increases/New Scope

- Why are we currently exceeding the initial budget guidance of $20.5 million by $1.1 million?
  - Estimates have increased from the January PP estimates in the following areas:
    - Booster Correctors up by $400k in M&S
    - MI Collimators up by $400k in M&S
  - New Scope
    - MI Injection and Extraction Kicker Modifications adds $227k of M&S
    - Booster Chopper Adds $150k of M&S
    - Booster Dump Relocation Adds $100k of M&S

Status Summary

- Upcoming Project Management effort for the Proton Plan :
  - Schedule
    - Continue to improve estimates of top down sections with input from Level 3 managers.
    - Compile estimate back up information within the plan via hyperlinks.
    - Prioritize the scope of the current Proton Plan. We want to be prepared to identify the lower priority areas in case additional descoping is necessary to stay within the initial budget guidance.
    - Review and revise contingency to more accurately reflect the current level of estimate for each section based on the level 3 managers input.
    - We will have a near baseline plan with the above improvements at the next PMG.
  - Reporting
    - In the near future earned value and obligation reporting will be done via COBRA.
  - MIE/AIP
    - Develop Plant/Line Item projects within the Proton Plan as requested by the Division Head and Directorate… Project Execution Plan, Davis Bacon Justification, Etc.